IN THE CLAIMS:

Claims 1-51 have been amended herein. All of the pending claims 1 through 51 are presented below. This listing of claims will replace all prior versions and listings in the application. Please enter these claims as amended.

1. (Currently Amended) A pressure compensated core barrel apparatus, comprising:
an outer barrel assembly including a core bit secured to a lower end thereof and an opposing upper end configured for attachment to a drill string; and
an inner barrel assembly disposed within ~~said~~ the outer barrel assembly and including a chamber, ~~said~~ the inner barrel assembly configured to maintain fluid contained within ~~said~~ the chamber at or below a specified pressure.

2. (Currently Amended) The pressure compensated core barrel apparatus of claim 1, further comprising a layer of sponge material disposed on at least a portion of an interior wall of ~~said~~ the chamber, ~~said~~ the sponge material adapted to absorb at least one specified reservoir fluid.

3. (Currently Amended) A piston assembly for providing a fluid seal within an inner barrel assembly of a core barrel apparatus, ~~said~~ the inner barrel assembly including an interior wall, ~~said~~ the piston assembly comprising:
a piston configured to provide a fluid seal between an outer cylindrical surface of ~~said~~ the piston and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly;
at least one laterally movable locking element associated with ~~said~~ the piston, ~~said~~ the at least one locking element configured to engage a cooperative structure of ~~said~~ the interior wall of ~~said~~ the inner barrel assembly when ~~said~~ the at least one locking element is at a first position and to disengage ~~said~~ the cooperative structure when ~~said~~ the at least one locking element is at a second position; and
a slidable piston rod associated with ~~said~~ the piston, ~~said~~ the piston rod located and configured to maintain ~~said~~ the at least one locking element at ~~said~~ the first position when ~~said~~ the

piston rod is at one position, ~~said~~ the piston rod further configured for travel relative to ~~said~~ the piston to another position where ~~said~~ the at least one locking element is free to move to ~~said~~ the second position.

4. (Currently Amended) The piston assembly of claim 3, further comprising a disk-shaped portion on one end of ~~said~~ the piston rod, ~~said~~ the disk-shaped portion having a substantially planar surface located and oriented for contacting a core entering ~~said~~ the inner barrel assembly.

5. (Currently Amended) The piston assembly of claim 3, further comprising a fluid passageway configured to extend from a first end of ~~said~~ the piston to a second opposing end of ~~said~~ the piston when ~~said~~ the piston rod is at ~~said~~ the another position.

6. (Currently Amended) The piston assembly of claim 5, wherein ~~said~~ the fluid passageway comprises a bore extending through ~~said~~ the piston rod and at least one port extending through ~~said~~ the piston rod substantially transverse to ~~said~~ the bore of ~~said~~ the piston rod and in fluid communication therewith.

7. (Currently Amended) The piston assembly of claim 6, further comprising:

a disk-shaped portion on one end of ~~said~~ the piston rod, ~~said~~ the disk-shaped portion having a substantially planar surface located and oriented for contacting a core entering ~~said~~ the inner barrel assembly; and

at least one port extending through ~~said~~ the disk-shaped portion substantially transverse to ~~said~~ the bore of ~~said~~ the piston rod and in fluid communication therewith.

8. (Currently Amended) The piston assembly of claim 3, further comprising an O-ring type seal configured to provide ~~said~~ the fluid seal between ~~said~~ the outer cylindrical surface of ~~said~~ the piston and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly.

9. (Currently Amended) A pressure compensated inner barrel assembly for use in a core barrel apparatus, comprising:

an inner barrel assembly having an interior wall;

a sealing mechanism disposed at one end of ~~said~~ the inner barrel assembly configured to provide a fluid seal between ~~said~~ the sealing mechanism and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly;

a pressure compensation mechanism disposed at an opposing end of ~~said~~ the inner barrel assembly and configured to provide a fluid seal between ~~said~~ the pressure compensation mechanism and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly, a region within ~~said~~ the interior wall of ~~said~~ the inner barrel assembly between ~~said~~ the sealing mechanism and ~~said~~ the pressure compensation mechanism forming a chamber; and

a pressure relief element disposed on ~~said~~ the pressure compensation mechanism configured to maintain fluid contained within ~~said~~ the chamber at or below a specified pressure.

10. (Currently Amended) The pressure compensated inner barrel assembly of claim 9, wherein ~~said~~ the pressure relief element comprises a pressure relief valve configured to release a controlled volume of fluid from ~~said~~ the chamber when fluid pressure within ~~said~~ the chamber exceeds ~~said~~ the specified pressure.

11. (Currently Amended) The pressure compensated inner barrel assembly of claim 9, further comprising a thermal compensation mechanism coupled to ~~said~~ the pressure compensation mechanism and configured to move ~~said~~ the pressure compensation mechanism through ~~said~~ the inner barrel assembly in response to a change in temperature to expand ~~the~~ a volume of ~~said~~ the chamber.

12. (Currently Amended) The pressure compensated inner barrel assembly of claim 11, wherein:

~~said~~the pressure compensation mechanism comprises a cylindrical housing having ~~said~~ the pressure relief element disposed thereon, ~~said~~ the cylindrical housing configured to provide a movable fluid seal between an outer surface of ~~said~~ the cylindrical housing and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly; and

~~said~~the thermal compensation mechanism comprises an adjusting sleeve slidably disposed in ~~said~~ the inner barrel assembly, ~~said~~ the adjusting sleeve having one end secured to ~~said~~ the cylindrical housing of ~~said~~ the pressure compensation mechanism and further including an opposing end configured to abut an end of a sponge liner disposed in ~~said~~ the inner barrel assembly, ~~said~~ the adjusting sleeve configured to move ~~said~~ the cylindrical housing through ~~said~~ the inner barrel assembly in response to thermal expansion of ~~said~~ the sponge liner.

13. (Currently Amended) The pressure compensated inner barrel assembly of claim 9, wherein ~~said~~ the sealing mechanism comprises:

a piston configured to provide a fluid seal between an outer cylindrical surface of ~~said~~ the piston and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly;

at least one laterally movable locking element associated with ~~said~~ the piston, ~~said~~ the at least one locking element configured to engage a cooperative structure of ~~said~~ the interior wall of ~~said~~ the inner barrel assembly when ~~said~~ the at least one locking element is at a first position and to disengage ~~said~~ the cooperative structure when ~~said~~ the at least one locking element is at a second position; and

a slidable piston rod associated with ~~said~~ the piston, ~~said~~ the piston rod located and configured to maintain ~~said~~ the at least one locking element at ~~said~~ the first position when ~~said~~ the piston rod is at one position, ~~said~~ the piston rod further configured for travel relative to ~~said~~ the piston to another position where ~~said~~ the at least one locking element is free to move to ~~said~~ the second position.

14. (Currently Amended) The pressure compensated inner barrel assembly of claim 13, wherein ~~said~~ the sealing mechanism further comprises a fluid passageway configured to allow fluid within ~~said~~ the chamber to flow from a first end of ~~said~~ the piston facing ~~said~~ the chamber to a second opposing end of ~~said~~ the piston when ~~said~~ the piston rod is at ~~said~~ the another position.

15. (Currently Amended) A valve assembly for interconnecting a first inner tube section to a second inner tube section of a multi-section inner barrel assembly of a coring apparatus, ~~said~~ the valve assembly comprising:

a lower seal assembly including a housing having a cylindrical bore extending therethrough, ~~said~~ the housing further including a lower end configured for attachment to an upper end of ~~said~~ the first inner tube section and an opposing upper end, ~~said~~ the lower seal assembly further including a seal element disposed in ~~said~~ the housing and configured to provide a fluid seal in ~~said~~ the cylindrical bore; and

an upper seal assembly including a housing having a cylindrical bore extending therethrough, ~~said~~ the housing of ~~said~~ the upper seal assembly further including an upper end configured for attachment to a lower end of ~~said~~ the second inner tube section and an opposing lower end configured for attachment to ~~said~~ the upper end of ~~said~~ the housing of ~~said~~ the lower seal assembly, ~~said~~ the upper seal assembly further including a seal element disposed in ~~said~~ the housing and configured to provide a fluid seal in ~~said~~ the cylindrical bore of ~~said~~ the housing of ~~said~~ the upper seal assembly.

16. (Currently Amended) The valve assembly of claim 15, wherein ~~said~~ the seal element of ~~said~~ the lower seal assembly is selected from a group consisting of a substantially planar diaphragm, a dome-shaped diaphragm, a conically shaped diaphragm, a ball valve, and a releasable piston.

17. (Currently Amended) The valve assembly of claim 15, wherein ~~said~~ the seal element of ~~said~~ the upper seal assembly is selected from a group consisting of a substantially planar diaphragm, a dome-shaped diaphragm, a conically shaped diaphragm, a ball valve, and a releasable piston.

18. (Currently Amended) The valve assembly of claim 15, further comprising a tap disposed on one of ~~said~~ the housing of ~~said~~ the lower seal assembly and ~~said~~ the housing of ~~said~~ the upper seal assembly configured for introducing fluid into ~~said~~ the cylindrical bore of ~~said~~ the lower seal assembly and ~~said~~ the cylindrical bore of ~~said~~ the upper seal assembly.

19. (Currently Amended) A near-bit swivel assembly for supporting an inner barrel assembly within an outer barrel assembly of a coring apparatus, ~~said~~ the outer barrel assembly having a core bit secured to a lower end thereof, ~~said~~ the near-bit swivel assembly comprising:

a bearing assembly disposed at a lower end of ~~said~~ the inner barrel assembly adjacent ~~said~~ the core bit configured to radially position and orient ~~said~~ the inner barrel assembly relative to a rotational axis of ~~said~~ the outer barrel assembly and further configured to maintain ~~said~~ the inner barrel assembly at a substantially fixed longitudinal position along ~~said~~ the rotational axis of ~~said~~ the outer barrel assembly; and

a latch mechanism disposed on one of an interior wall of ~~said~~ the core bit and an interior wall of ~~said~~ the inner barrel assembly configured, in cooperation with ~~said~~ the bearing assembly, to maintain ~~said~~ the inner barrel assembly at ~~said~~ the substantially fixed longitudinal position;

wherein an opposing upper end of ~~said~~ the inner barrel assembly is freely movable within ~~said~~ the outer barrel assembly along ~~said~~ the rotational axis thereof.

20. (Currently Amended) The near-bit swivel assembly of claim 19, wherein ~~said~~ the bearing assembly comprises:

a radial bearing assembly including a journal secured to ~~said~~ the lower end of ~~said~~ the inner barrel assembly located and configured to slidably mate with a bushing secured to one of ~~said~~ the interior wall of ~~said~~ the core bit and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly;

a thrust bearing assembly secured to ~~said~~ the lower end of ~~said~~ the inner barrel assembly including a thrust plate having a lower surface abutting a shoulder extending from one of ~~said~~ the interior wall of ~~said~~ the core bit and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly and an opposing upper surface, ~~said~~ the thrust bearing assembly further including a bearing plate having a lower surface located and configured to slidably mate with ~~said~~ the upper surface of ~~said~~ the thrust plate and an opposing upper surface disposed in close proximity to a register surface of ~~said~~ the latch mechanism.

21. (Currently Amended) The near-bit swivel assembly of claim 19, wherein ~~said~~ the latch mechanism comprises a retractable pawl secured to one of ~~said~~ the interior wall of ~~said~~ the core bit and ~~said~~ the interior wall of ~~said~~ the inner barrel assembly, ~~said~~ the retractable pawl resiliently biased toward ~~said~~ the rotational axis of ~~said~~ the outer barrel assembly and located and configured to allow passage thereby of ~~said~~ the lower end of ~~said~~ the inner barrel assembly, ~~said~~ the retractable pawl further including at least one register surface configured to engage a surface of ~~said~~ the bearing assembly when ~~said~~ the inner barrel assembly is fully inserted into ~~said~~ the outer barrel assembly to maintain ~~said~~ the inner barrel assembly at ~~said~~ the substantially fixed longitudinal position.

22. (Currently Amended) A sponge liner for use in a sponge core barrel assembly, ~~said~~ the sponge core barrel assembly including an inner barrel assembly formed of a first material and having a bore extending therethrough, ~~said~~ the sponge liner comprising:

a tubular sleeve formed of a second material and having an outer cylindrical surface sized and configured to be slidably disposed in ~~said~~ the bore of ~~said~~ the inner barrel assembly, ~~said~~

the tubular sleeve further including at least one groove formed in an inner cylindrical surface thereof, ~~said~~ the at least one groove having a cross-sectional shape; and

an annular sponge layer formed of a material adapted to absorb at least one specified reservoir fluid, ~~said~~ the annular sponge layer including an interior cavity and an outer cylindrical surface secured to ~~said~~ the inner cylindrical surface of ~~said~~ the tubular sleeve, ~~said~~ the annular sponge layer extending into ~~said~~ the at least one groove.

23. (Currently Amended) The sponge liner of claim 22, wherein ~~said~~ the at least one groove comprises a groove configured in a helix about ~~said~~ the inner cylindrical surface of ~~said~~ the tubular sleeve, a groove extending longitudinally along ~~said~~ the inner cylindrical surface of ~~said~~ the tubular sleeve, or a groove extending circumferentially along ~~said~~ the inner cylindrical surface of ~~said~~ the tubular sleeve.

24. (Currently Amended) The sponge liner of claim 22, wherein ~~said~~ the cross-sectional shape of ~~said~~ the at least one groove is selected from a group consisting of a dove-tail shape, a generally circular shape, and a generally elliptical shape.

25. (Currently Amended) The sponge liner of claim 22, wherein ~~said~~ the second material comprises a material identical to ~~said~~ the first material or a material exhibiting a rate of thermal expansion substantially equivalent to a rate of thermal expansion of ~~said~~ the first material.

26. (Currently Amended) The sponge liner of claim 22, further comprising a plurality of perforations extending through ~~said~~ the tubular sleeve.

27. (Currently Amended) The sponge liner of claim 22, further comprising a shaped contour on at least one end of ~~said~~ the sponge liner, ~~said~~ the shaped contour configured to mate with a ~~corresponding~~ correspondingly shaped contour on an end of a second, adjacent sponge

liner, wherein ~~said~~ the shaped contour on ~~said~~ the sponge liner and ~~said~~ the ~~corresponding~~ correspondingly shaped contour on ~~said~~ the second sponge liner are cooperatively configured to provide an interlocking end-to-end connection between ~~said~~ the sponge liner and ~~said~~ the second sponge liner.

28. (Currently Amended) The sponge liner of claim 27, wherein ~~said~~ the shaped contour on ~~said~~ the at least one end of ~~said~~ the sponge liner and ~~said~~ the ~~corresponding~~ correspondingly shaped contour on ~~said~~ the end of ~~said~~ the second sponge liner are selected from a group consisting of a bevel contour, a generally parabolic contour, and a tongue-in-groove.

29. (Currently Amended) The sponge liner of claim 22, further comprising a layer of webbing material disposed in ~~said~~ the annular sponge layer.

30. (Currently Amended) The sponge liner of claim 29, wherein ~~said~~ the layer of webbing material is disposed in ~~said~~ the annular sponge layer at a location proximate ~~said~~ the interior cavity.

31. (Currently Amended) A sponge liner for use in a sponge core barrel assembly, ~~said~~ the sponge core barrel assembly including an inner barrel assembly formed of a first material and having a bore extending therethrough, ~~said~~ the sponge liner comprising:

a tubular sleeve formed of a second material and having an inner cylindrical surface and an outer cylindrical surface sized and configured to be slidably disposed in ~~said~~ the bore of ~~said~~ the inner barrel assembly, ~~said~~ the second material exhibiting a rate of thermal expansion substantially equivalent to a rate of thermal expansion of ~~said~~ the first material; and

an annular sponge layer formed of a material adapted to absorb at least one specified reservoir fluid, ~~said~~ the annular sponge layer including an interior cavity and an outer cylindrical surface secured to ~~said~~ the inner cylindrical surface of ~~said~~ the tubular sleeve.

32. (Currently Amended) The sponge liner of claim 31, wherein ~~said~~ the second material comprises a material identical to ~~said~~ the first material.

33. (Currently Amended) A sponge liner for use in a sponge core barrel assembly, ~~said~~ the sponge core barrel assembly including an inner barrel assembly having a bore extending therethrough, ~~said~~ the sponge liner comprising:

a tubular sleeve having an inner cylindrical surface and an outer cylindrical surface sized and configured to be slidably disposed in ~~said~~ the bore of ~~said~~ the inner barrel assembly;

an annular sponge layer formed of a material adapted to absorb at least one specified reservoir fluid, ~~said~~ the annular sponge layer including an interior cavity and an outer cylindrical surface secured to ~~said~~ the inner cylindrical surface of ~~said~~ the tubular sleeve; and

a layer of webbing material disposed in ~~said~~ the annular sponge layer about at least a portion of a circumference of ~~said~~ the annular sponge layer.

34. (Currently Amended) The sponge liner of claim 33, wherein ~~said~~ the layer of webbing material is disposed in ~~said~~ the annular sponge layer at a location proximate ~~said~~ the interior cavity.

35. (Currently Amended) An integrated sponge barrel for use in a sponge core barrel apparatus, comprising:

at least one inner tube section having an inner cylindrical surface; and

an annular sponge layer constructed of a material adapted to absorb at least one specified reservoir fluid, ~~said~~ the annular sponge layer including an interior cavity and an outer cylindrical surface secured to ~~said~~ the inner cylindrical surface of ~~said~~ the at least one inner tube section;

wherein ~~said~~ the at least one inner tube section is sized and configured for direct disposition in an outer barrel assembly without a surrounding inner barrel.

36. (Currently Amended) The integrated sponge barrel of claim 35, further comprising at least one groove formed in ~~said~~ the inner cylindrical surface of at least one inner tube section, ~~said~~ the at least one groove having a cross-sectional shape, ~~said~~ the annular sponge layer extending into ~~said~~ the at least one groove.

37. (Currently Amended) The integrated sponge barrel of claim 36, wherein ~~said~~ the at least one groove comprises a groove configured in a helix about ~~said~~ the inner cylindrical surface of ~~said~~ the at least one inner tube section, a groove extending longitudinally along ~~said~~ the inner cylindrical surface of ~~said~~ the at least one inner tube section, or a groove extending circumferentially along ~~said~~ the inner cylindrical surface of ~~said~~ the at least one inner tube section.

38. (Currently Amended) The integrated sponge barrel of claim 36, wherein ~~said~~ the cross-sectional shape of ~~said~~ the at least one groove is selected from a group consisting of a dove-tail shape, a generally circular shape, and a generally elliptical shape.

39. (Currently Amended) The integrated sponge barrel of claim 35, further comprising a plurality of perforations extending through ~~said~~ the at least one inner tube section.

40. (Currently Amended) The ~~sponge liner~~ integrated sponge barrel of claim 35, further comprising a layer of webbing material disposed in ~~said~~ the annular sponge layer.

41. (Currently Amended) The ~~sponge liner~~ integrated sponge barrel of claim 40, wherein ~~said~~ the layer of webbing material is disposed in ~~said~~ the annular sponge layer at a location proximate ~~said~~ the interior cavity.

42. (Currently Amended) A method of providing a fluid seal in an inner barrel assembly of a core barrel apparatus, comprising:

providing a fluid seal between an interior wall of ~~said~~ the inner barrel assembly and an outer cylindrical surface of a piston disposed in ~~said~~ the inner barrel assembly;

abutting a surface of a slidable piston rod associated with ~~said~~ the piston against a laterally movable locking element associated with ~~said~~ the piston to bias ~~said~~ the locking element against a cooperative structure of ~~said~~ the interior wall of ~~said~~ the inner barrel assembly to lock ~~said~~ the piston at a fixed position within ~~said~~ the inner barrel assembly; and

moving ~~said~~ the piston rod relative to ~~said~~ the piston in response to contact with a core sample to position ~~said~~ the piston rod at a location allowing ~~said~~ the locking element to move away from ~~said~~ the cooperative structure to release ~~said~~ the piston and enable ~~said~~ the piston to travel freely within ~~said~~ the inner barrel assembly.

43. (Currently Amended) The method of claim 42, further comprising providing a fluid passageway through at least one of ~~said~~ the piston and ~~said~~ the piston rod when ~~said~~ the piston rod is at ~~said~~ the location to enable fluid contained within ~~said~~ the inner barrel assembly to flow out of ~~said~~ the inner barrel assembly through ~~said~~ the fluid passageway.

44. (Currently Amended) A method of supporting an inner barrel assembly within an outer barrel assembly of a core barrel apparatus, ~~said~~ the outer barrel assembly having a core bit secured to a lower end thereof, comprising:

supporting a portion of ~~said~~ the inner barrel assembly proximate a lower end thereof and adjacent ~~said~~ the core bit to radially position and orient ~~said~~ the inner barrel assembly relative to a rotational axis of ~~said~~ the outer barrel assembly and to maintain ~~said~~ the inner barrel assembly at a substantially fixed longitudinal position along ~~said~~ the rotational axis of ~~said~~ the outer barrel assembly; and

allowing an opposing upper end of ~~said~~ the inner barrel assembly to freely move longitudinally within ~~said~~ the outer barrel assembly along ~~said~~ the rotational axis thereof.

45. (Currently Amended) A method of securing a layer of sponge material to an interior of a tubular structure, comprising:

forming at least one groove in an interior cylindrical surface of ~~said~~ the tubular structure; and

extending ~~said~~ the layer of sponge material into ~~said~~ the at least one groove in ~~said~~ the interior cylindrical surface.

46. (Currently Amended) The method of claim 45, wherein extending ~~said~~ the layer of sponge material into ~~said~~ the at least one groove comprises molding ~~said~~ the layer of sponge material into ~~said~~ the at least one groove.

47. (Currently Amended) A method of constructing an inner barrel assembly for a sponge core barrel apparatus comprising securing a layer of sponge material adapted to absorb at least one specified reservoir fluid directly to an interior cylindrical surface of ~~said~~ the inner barrel assembly.

48. (Currently Amended) A method of eliminating differential thermal expansion between an inner barrel assembly of a sponge core barrel apparatus and at least one sponge liner disposed in ~~said~~ the inner barrel assembly, ~~said~~ the at least one sponge liner including a layer of sponge material secured to an interior cylindrical surface of a tubular sleeve, comprising:

constructing ~~said~~ the inner barrel assembly of a first material; and

constructing ~~said~~ the tubular sleeve of ~~said~~ the at least one sponge liner from a second material exhibiting a rate of thermal expansion substantially equivalent to a rate of thermal expansion of ~~said~~ the first material.

49. (Currently Amended) The method of claim 48, further comprising constructing ~~said~~ the tubular sleeve of a material that is identical to ~~said~~ the first material.

50. (Currently Amended) A method of reducing friction between a core sample and an interior wall of an inner barrel, at least a portion of ~~said~~ the interior wall comprising a layer of sponge material adapted to absorb at least one specified reservoir fluid, ~~said~~ the method comprising disposing a layer of webbing material in ~~said~~ the layer of sponge material to strengthen ~~said~~ the layer of sponge material.

51. (Currently Amended) The method of claim 50, further comprising disposing ~~said~~ the layer of webbing material in ~~said~~ the layer of sponge material at a location proximate an interior chamber of ~~said~~ the inner barrel.